Evaluation of DuroTrim Vegetation Control Mats

Final Report
For
HR-2090

March 2002

Highway Division

Iowa Department
Of Transportation

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8. ABSTRACT

The routine maintenance along Iowa's highways and roadways during the summer growing season is a time consuming and costly endeavor. Trimming around guardrail posts and delineator posts is especially costly due to the handwork required. Trimming costs account for approximately 50% of the shoulder mowing costs according to expense figures obtained from the Iowa Department of Transportation (DOT), Office of Maintenance. The FY 2001 statewide trimming cost for the Iowa DOT was approximately $430,000 ($305,000 labor, $125,000 equipment and materials).

This product would be required to perform well for 9-21 years, on average, in order to recoup the cost of installation. This includes the durability of the product, but not the cost of repair due to traffic damage, snowplow and wing damage, or damage caused by mowing operations. Maintenance costs associated with vegetation creep over the mats and repair costs would extend the required service life.

As a result of resource realignment, the Iowa DOT roadside maintenance policy, for FY 2003 and the future, will be to eliminate trimming around delineator posts unless the reflector is obstructed. This policy change will effectively eliminate the need for weed control mats due to the significant reduction in trimming.

The use of the weed control mats could be justified in areas that are dangerous to maintenance workers such as guardrail installations in high traffic areas. Because the delineator posts are further from the edge of the traveled roadway, there is a reduced risk to the maintenance workforce while hand trimming.

Because the DuroTrim Vegetation Control Mats appear to have performed adequately in the field trial, they could be considered for use, where safety conditions warrant. That use should be limited, however, due to the considerable initial cost and changes in Iowa DOT roadside maintenance policy. Applications should be limited to instances where the use of the DuroTrim Vegetation Control Mats would have a significant impact on the safety of the roadside maintenance workers. The cost savings, due to the elimination of the trimming and mowing alone, is not enough to justify their use in most situations at their current cost. The test sections will continue to be monitored periodically so that an approximate service life can be determined.

9. KEY WORDS

Vegetation Control
Roadside Trimming
Roadside Maintenance

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Introduction

The routine maintenance along Iowa's highways and roadways during the summer growing season is a time consuming and costly endeavor. Trimming around guardrail posts and delineator posts is especially costly due to the handwork required. Trimming costs account for approximately 50% of the shoulder mowing costs according to expense figures obtained from the Iowa Department of Transportation (DOT), Office of Maintenance. The FY 2001 statewide trimming cost for the Iowa DOT was approximately $430,000 ($305,000 labor, $125,000 equipment and materials).

Project Background

The Maintenance Office of the Iowa DOT was contacted by Welch Products, Inc., Carlisle, Iowa regarding the use of DuroTrim Vegetation Control Mats around guardrail and delineator posts for elimination of trimming. The Maintenance Office elected to place a trial on a section of I-35 near Ames, Iowa. After the trial section was placed, the product was submitted to the Iowa DOT Product Evaluation Committee for review. The application that was provided to the Product Evaluation Committee for review under product number M-00-1 is included in Appendix A.

Objective

The objective of this research was to evaluate the performance of DuroTrim Vegetation Control Mats for eliminating trimming around roadside delineator and guardrail posts and to weigh the cost of purchasing and placing the mats versus hand trimming costs.

Project Location

The DuroTrim Vegetation Control Mats were placed in two research sections. Site #1 was associated with Interstate delineator posts installations along a 12-mile section of Northbound I-35 from its junction with IA 926 north to its junction with county road C-47 (near Dows). Site #2 was a guardrail installation at a bridge on I-35 over US 30 east of Ames.

Product Description

DuroTrim Vegetation Control Mats are 2ft x 2ft tiles composed of shredded used tires bound together with a urethane resin binder. The manufacturer recommended the use of two tiles per delineator post for a 4ft x 2ft mat. The mats weigh approximately 4.25 lbs. per square foot and are connected and sealed at the joints using a one-part urethane adhesive. Appendix B contains photos from the field review.

Product Placement

Site #1: The vegetation mats were placed in September and October 1999. The original plan called for a 4ft x 2ft mat to be placed at each delineator post. The installation was done by Iowa DOT employees utilizing Iowa DOT equipment. Two 2ft x 2ft mats were bonded together at each post using the recommended adhesive from a standard caulking gun.

Site #2: Approximately 550 vegetation mats were placed at a median bullnose guardrail installation during the spring of 2000. This installation required additional site preparation that was not necessary for the delineator post installation. The ground had to be leveled using hand tools and the mats required trimming in the curved sections of the guardrail.

Product Performance

Site #1: Soon after the original installation, vegetation began to grow through the seams of the mats and around the posts between the post and the mat. A different adhesive was used on subsequent installations, which corrected the problem.

The original installation size of a 4ft x 2ft mat was neither wide nor long enough to eliminate the hand trimming. Different sizes were tried and a 4ft wide x 6ft long mat was determined to be the optimum size for the current fleet of mowers operated by the Iowa DOT.

There were no problems associated with the mats being caught by the mower blades as they passed over. The weight of the mats was sufficient to keep the mats on the ground. There was a minimal problem with vegetation creep over the sides of the mats through the course of a growing season in areas with very fertile soil. That problem was solved by simply lifting the edges of the mats and placing them back down once a year. This is a simple operation but it does have a labor cost associated with it.

Site #2: There were minimal product performance problems at the guardrail installation. The vegetation creep issue remained but could be solved in the same manner as was done at site #1.

The only other issue at this site was due to a vehicle accident at the guardrail. The impact of the vehicle on the guardrail tore a section of the vegetation mats loose. Most of the mats came apart at the seams and were able to be reused, but there was a considerable labor expense for replacing the installation. The mats did prove to be durable however, and only two or three needed to be replaced.

Cost Analysis

Delineator posts are spaced a distance of 1/20 mile along Iowa's Interstate, freeway, and expressway system. Delineators are placed on the primary system, but are not at regular intervals. They are placed near hazards such as bridges. There are approximately 31,000 delineator posts along Iowa's nearly 782 miles of Interstate roadway.

If vegetation control mats were used to eliminate trimming, approximately $430,000 ($305,000 labor, $125,000 equipment and materials) in trimming expenses would be eliminated each year. The entire savings would not be available for the purchase of vegetation control mats however. The workforce would not be reduced as a result of the elimination of trimming, but would be diverted to other maintenance functions. Therefore, the labor expenses associated with trimming would still impact the Iowa DOT maintenance budget. Likewise, the entire savings due to materials and labor would not be realized due to the increased expenses in equipment and materials associated with the diversion of resources to other functions. The assumed savings available for the purchase of the vegetation control mats is $125,000 per year, although the actual amount will likely be much less.

The cost of placing the vegetation mats at the delineator posts was approximately $35 per delineator post (labor and materials) for the 2ft x 4ft size at site #1. The cost of placing the 4ft x 6ft mats that were required for adequate performance was approximately $85 per delineator post (labor and materials). The cost of the installation at the guardrail (site #2) was approximately $8,500.

Using the manufacturer's recommended mat size ($35 per installation), the Iowa DOT would be able to purchase and install approximately 3,570 mats. The service life of the mats would have to be nearly nine years to recoup the cost of installation. If the 4ft x 6ft size were used, the Iowa DOT would be able to purchase and install approximately 1,470 mats. The service life of the mats would have to be over 21 years to recoup the cost of installation. This does not include any estimate for yearly maintenance of the mats as may be necessary and includes the Interstate system only. The manufacturer's limited warranty covers only the workmanship and the material for a period of five years.

Conclusions and Recommendations

This product would be required to perform well for 9-21 years, on average, in order to recoup the cost of installation. This includes the durability of the product, but not the cost of repair due to traffic damage, snowplow and wing damage, or damage caused by mowing operations. Maintenance costs associated with vegetation creep over the mats and repair costs would extend the required service life.

As a result of resource realignment, the Iowa DOT roadside maintenance policy, for FY 2003 and the future, will be to eliminate trimming around delineator posts unless the reflector is obstructed. This policy change will effectively eliminate the need for weed control mats due to the significant reduction in trimming.

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Appendix A
Product Evaluation Application

Form 650075
8-99

Iowa Department of Transportation

PRODUCTS EVALUATION COMMITTEE

Project Development Division
Ames, Iowa

Committee Action

M-00-1

Product Number/APEL Number
(DOT Use Only)

DATA FOR PRODUCT, MATERIAL, OR PROCEDURE EVALUATION

1. Date: June 26, 2000

2. Product, Material , Procedure *(Trade name)*: DUROTRIM Anti Vegetation Tile

3. Manufacturer: Welch Products Inc.
   Address 205 S. Garfield Carlisle, Iowa 50047
   Phone No. 515-989-0829 Fax No. 515-989-0344 E-Mail welchproducts@dwx.com

4. Representative or Distributor: Recycled Rubber Resources
   Address 612 Blees Industrial Drive Macon, Missouri 63552
   Phone No. 660-385-7156 Fax No. 660-385-7158 E-Mail rrrllc@missvalley.com

5. Product, Material, Procedure Description: See attached FAQ document

6. Recommended Use: See attached FAQ document

7. Material Composition: See attached FAQ document

8. Equipment or Machinery Required: High speed jigsaw for cutting, caulking gun for tube adhesive application. crack sealant applicator equipment for box rubber sealeant optional adhesive application.

9. Manufacturer's Specifications: ☒ Attached ☐ Available

10. Information from Manufacturer:
    Plan drawing, picture, sketch ☒ Attached ☐ Available
    Instructions for use ☒ Attached ☐ Available
    Other:

11. Free sample can be furnished: Buy 50--get 50 "First Mile Program"

12. Availability: ☐ Seasonal ☒ Non-seasonal
    Comments
    Is available quantity limited? no
    Delivery time typical 2-3 weeks, but to some extent volume dependent

13. Product supplied in what units: sold as "each" shipped 200 per pallet

14. Cost of Product: see attached FAQ document

15. Product Patented: ☒ Yes ☐ No New Existing: 5,323,557 dated June 1994 Applied for March 31, 2000 (Date)

16. Product Guaranteed: ☒ Yes ☐ No

Guarantee terms: 5 year limited warranty--see FAQ document

17. Meets following specifications: AASHTO see attached FAQ document

ASTM _____ Federal _____

18. Approved by Federal Highway Administration: GSA Contract GS-07F-0264J

For standard use as needed For experimental use only _____

19. Approved for use by following agencies:

_____ (Agency) ☐ Standard Use ☐ Experimental Use

_____ (Agency) ☐ Standard Use ☐ Experimental Use

_____ (Agency) ☐ Standard Use ☐ Experimental Use

20. Agencies which have used product:

_____ (Agency) Date: _____ ☐ Regular ☐ Experimental Use

_____ (Agency) Date: _____ ☐ Regular ☐ Experimental Use

_____ (Agency) Date: _____ ☐ Regular ☐ Experimental Use

21. Comments by Iowa Department of Transportation employee submitting this information report: _____

Submitted by: _____ Submitted by: _____

Title _____ (Manufacturer-Supplier) Title _____ (Department of Transportation Office)

Ten copies of this completed form along with ten copies of descriptive literature, brochures, etc. shall be submitted to Research Engineer, Office of Materials, Iowa Department of Transportation, 800 Lincoln Way, Ames, Iowa 50010.

Disclosure Statement: The information furnished on this form will be used by the Department of Transportation to determine approval or denial of the application. Failure to provide all information will result in denial of the application. Information furnished is public information and copies may be provided to the public upon request. All product samples submitted to the Iowa DOT for evaluation shall be subject to any testing deemed necessary by the Iowa DOT without prior notification or approval of the product supplier or manufacturer. Any samples considered hazardous may be returned to the product supplier, upon completion of evaluation and testing, at the discretion of the Iowa DOT.

Appendix B
Photos

Figure 1
2 ft x 4 ft Delineator Post Application, Site 1

Figure 2
2 ft x 8 ft Delineator Post Application, Site

Figure 3
Guardrail Post Application, Site 2

Figure 4
Guardrail Post Application, Site 2
After Vehicle Collision